

Zero Retries issue 0227 2025-11-07

Zero Retries is an independent newsletter promoting technological innovation in and adjacent to Amateur Radio, and Amateur Radio as (literally) a license to experiment with and learn about radio technology. Radios are computers - with antennas! Now in its fifth year of publication, with 3200+ subscribers.

About Zero Retries

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Paid Subscribers Update

My thanks to **Prefers to Remain Anonymous 17** for *renewing* as an **Annual Paid Subscriber** to Zero Retries this past week - *3rd year!*

My thanks to **Prefers to Remain Anonymous 105** for *upgrading* from a free subscriber to Zero Retries to an **Annual Paid Subscriber** this past week!

Financial support from Zero Retries readers is a significant vote of support for the continued publication of Zero Retries.

Substack Newsletters Internal Links Seem to be Working Again

For a few months, clicking on an internal link to this (and other) Substack newsletters seemed to redirected to the newsletter, not individual stories (internal links) *in* the newsletter. Now that feature seems to be working again, it's pretty useful to click and go right to the story instead of having to scan through the entire issue to find the story of interest. Thus, I'll restart embedding internal links into the Table of Contents¹ of each issue of Zero Retries. It's a bit tedious, and thus only worth doing if it's useful and working. Please [advise me](#) if internal links don't, or stop, working.

Nice Mention of Zero Retries Article in Amateur Radio Newsline

It's always fun (and humbling, given AR Newsline's stature within Amateur Radio) when an article or mention in Zero Retries gets picked up by Amateur Radio Newsline. In this case, Western Washington University Develops Electrical and Computer Engineering Department in **Zero Retries 0225**, which became:

[Amateur Radio Newsline Report 2505 for Friday, October 31st, 2025.](#)

From the script of that issue:

HAM TO CHAIR COLLEGE'S NEW ELECTRICAL AND COMPUTER ENGINEERING DEPARTMENT

STEPHEN/ANCHOR: Recognizing industry growth and student demand, a university in northern Washington State has developed a full Electrical and Computer Engineering Department on its campus - and it's being chaired by an amateur radio operator. We have those details from George Zafiropoulos, KJ6VU.

GEORGE: Starting in the fall of 2026, students at Western Washington University will be able to enroll in programs in the new Electrical and Computer Engineering Department and to pursue studies in the school's first engineering graduate program. The courses were previously housed within the school's Department of Engineering and Design.

The Zero Retries Newsletter, which reports the development in its latest edition, said that Janelle Leger, dean of the College of Science and Engineering, credited student and industry demand as the primary reasons for creation of a new department. She said the move is being made with support from the state to create the degree programs. Majors will select from four programs, which include wireless networking and signal processing focus, as well as AI, electronics and energy.

The professor chairing the new department is Andy Klein. On the university website, the professor writes that having a standalone department will pave the way to creating partnerships and internships with companies and generate more internships for students. Andy Klein is an amateur radio operator who received the callsign KG7WFT in July.

This is George Zafiropoulos, KJ6VU.

(STEVE STROH, N8GNJ, ZERO RETRIES NEWSLETTER; WESTERN WASHINGTON STATE UNIVERSITY)

Thanks Amateur Radio Newsline! It's always a pleasure to get "picked up".

AnySignal - Any... Signal...

(Not related to Amateur Radio - just one of my periodic excursions into what's possible with radio technology in the 2020s and beyond.)







Image courtesy of Steve Stroh N8GNJ

One of the savviest bits of promotion at [GNU Radio Conference 2025](#) were the hats (shown above) given away by the company [AnySignal](#). A handful of hats would appear on an otherwise empty table, several times per day. I now have a few of these. They're nice quality hats, with just the company logo on them:



Image courtesy of ANYSIGNAL

Of course, grabbing a nice hat compels one to look up what the hat provider is all about. AnySignal's [capabilities](#) cross a number of what used to be silos of radio technology - Space Communications, Autonomous Systems (drones), Electronic Warfare, and RADAR. Terrestrial communications isn't mentioned, which surprises me.

Given the size of their announced investments, AnySignal is a startup. It has a [lot of the right ideas](#):

You can't see the radio frequency spectrum. You can't touch it. But it's holding the modern world together: your GPS, your flight home, your satellite internet, even your national security. And it's breaking under the weight of rising complexity, adversarial threats, and outdated tools.

I would add regulatory paradigms based on poor selectivity, easily overwhelmed receiver technology of the 1930s that partitioned portions of spectrum for specific uses and users.

Governments and companies are waking up to a silent crisis: we are running out of spectrum and running out of time. This can't be solved by throwing money at legacy hardware or auctioning more spectrum. It demands a new approach — one that reimagines the entire RF stack.

Other than we *have* run out of spectrum - it's *all* been allocated... *yep!*

The 2020s are going to be figuring out how new radio systems tiptoe around (literally) the current regulatory patchwork quilt of antique radio regulations and legacy systems. The companies that leverage these new radio technologies to figure that out are going to do very well.

That's what AnySignal is. It's our version of "getting the band back together." It's the *Ocean's 11* moment — assembling a crew of engineers, operators, and systems thinkers who can cut through noise and just build.

We didn't just want smart people — we wanted builders. People who treat constraints as design tools, not excuses. People who ship.

I'll guess that a lot of the folks I've highlighted here in Zero Retries that are creating new systems are the kind of folks AnySignal would welcome... at least those who already live in or willing to relocate to the Los Angeles, California area. [AnySignal is hiring folks with radio technology capabilities.](#)

It's a delicious, if brief fantasy to imagine what an AnySignal Amateur Radio club could accomplish with that kind of radio technology talent wanting to "have some *fun* with radio". I bet they could come up with a SuperPeater in a weekend hacking session.

But my main point of admiration of AnySignal is that whoever came up with that brand name for the company, and that simple logo... was *brilliant* in choosing that name - *Any...Signal*... If the name AnySignal wasn't claimed as a company name (and undoubtedly ably defended against unauthorized use)... I'd be tempted to start using that concatenation of those two words to describe this new era of radio technology. As in *any signal* we can imagine (and new ones, that we cannot, yet, imagine) are possible.

That's the era we're in now with radio technology - **Any Signal** we can imagine, we can implement.

Building Up "Static" Articles for Easier Reference

I've been working on compiling static pages of recurring themes in Zero Retries. Such pages are listed in the **Zero Retries Guides** sub-page, which is linked at the top of the main Zero Retries page.

In Zero Retries articles I often re-discuss various projects, themes, technologies, ideas, etc. and doing a single reference to those single-topic pages are a lot easier for Zero Retries readers to get up to speed on a topic, instead of backtracking through previous issues of Zero Retries. One recent example is SuperPeater.

Compiling these pages also has the added benefit to me of consolidating these thoughts and previous articles as preparation for my book in progress, **The Zero Retries Guide to Amateur Radio in the 21st Century**. Each of those articles will likely end up as a chapter in the book.

Features Versus Products

One can learn a lot by listening to smart people (when they're being smart, not lapsing into arrogance and self-aggrandizement). One of the smartest people I've learned things from was Steve Jobs.

One of Job's gifts was being able to see beyond existing paradigms to imagine what was possible... and why it should be possible. That's how we got the iPhone (and Android) instead of evolutions of the then existing paradigms of mobile devices such as Blackberry and stylus-based handheld computers.

In commenting on non-Apple products, Jobs said a number of times "That's a *feature*, not a *product*". One of the "not-a-products" he was referring to was Dropbox, with file-sharing / file synchronization capabilities that would eventually be incorporated into Apple iCloud.... which took a while to get right. A hardware example was dialup modems, and add-in Ethernet cards, and then Wi-Fi adapters, all of which just became features rather than products.

We're already seeing this happen in Amateur Radio. A number of newer radios have audio interfaces integrated into them, so no external TNC or audio interface is needed. Hopefully we'll start seeing FreeDV RADE integrated into the more advanced Amateur Radios, so it won't be necessary to have RADE versions of the [ezDV](#).

Now that we're on the cusp of creating highly versatile devices for Amateur Radio such as the LinHT and perhaps the Stixs Radio, in evaluating projects, I think it's a useful framework for future projects to do an basic reality check:

*Is this project going to ultimately be a **product**, or is it destined to become a **feature**?"*

I hope a lot of folks decide for the latter and put their prodigious energies and talent into making projects like the LinHT increasingly useful with their ideas.

Weekends Are For Amateur Radio!

But sometimes weekends are for digging out troublesome stumps. Fortunately, there are now a lot of great tools for dealing with stumps, many of them powered by powerful, portable batteries. Alternating with steel wedges, axes, and hammers.

Have a great weekend, all of you co-conspirators in Zero Retries Interesting Amateur Radio activities!

Steve N8GNJ

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Starlink Made Me An Offer I Couldn't Refuse

By Steve Stroh N8GNJ

I was offered the indefinite use of a Starlink Mini unit, for a mere \$5 / month, and I happily accepted. When not being used itinerantly, this unit will provide dedicated, basic Internet connectivity for Amateur Radio systems in N8GNJ / Zero Retries Labs.



Starlink Mini on ground Image courtesy of Starlink / SpaceX

I received this email from Starlink this week:

Mini Kit now included with your Residential plan

As a thank you for being a loyal Residential customer, you'll receive a \$0 Starlink Mini—so you can take the same fast, reliable internet you use at home anywhere you go. Click below to redeem and keep reading for more details.

How it Works

- **Free Mini:** You'll receive a Starlink Mini for \$0, provided as a rental bundled with your active Residential plan.
- **Built-in WiFi:** Mini has an integrated router, so you get online without extra equipment.
- **Always Ready:** Upon arrival, your Mini will be on [Standby Mode](#) for \$5/mo, which includes unlimited low-speed data for backup and emergency messaging.
- **50% Off Roam:** When you are ready to travel, you can switch anytime to high-speed [Roam plans](#) at half the price.
- **Travel anywhere:** Bring your Mini on road trips, camping, or boating across 150+ countries, territories, and markets.

*Note: Redemption guaranteed through **November 17, 2025**. By redeeming, you agree to pay a monthly recurring fee of \$5/mo for Standby Mode or upgrade to Roam. If you cancel your Residential service plan or the service plan on your Mini, the Mini must be returned or its cost will be charged to your payment method. Normal wear and tear is expected upon return.*

The “unlimited low-speed data is 500 kbps which isn't exactly broadband speeds... but it's \$5 / month.

If that proves to be inadequate, apparently I can upgrade to the:

ROAM 50GB
Best for infrequent and individual travel with low usage
\$50/MO

But with *this* plan, that's not \$50 / month, *it's* \$25 / month.

The caveats:

- Again, for the \$5 / month basic charge, at 500 kbps, I won't be doing ~~any~~ much [3](#) video streaming.
- I'm *renting* the Starlink Mini. If I terminate my Starlink residential service (which I'm using via my purchased Starlink Gen2 residential terminal), the Starlink Mini must be returned to Starlink (or I will be charged for a purchase of “my” Starlink Mini).

- This offer is only available to me because I have an existing Starlink residential account.
- I had to act nearly immediately by 2025-11-17. I'm sure that's a bit of marketing psychology as I think for most folks with a residential Starlink account, it's only a decision point for a few minutes to decide that there's very little downside to this offer.
- There's apparently some service area restrictions for the roam plan, probably places like dense urban areas where there's no "spare" Starlink capacity.

But, to me, this is a heckuva deal, and I accepted the offer within minutes and apparently my Starlink mini was shipped this week.

500 kbps is, I think, going to be more than adequate for my limited Amateur Radio activities in N8GNJ / Zero Retries Labs. It's also very timely that I could set it up to be powered from my new backup power system as the Starlink Mini can use direct 12 volt power (or USB-C). I plan to use the 44Net Virtual Private Network with the Starlink Mini to have a usable IPv4 address for access to N8GNJ / Zero Retries Labs radio systems.

The Starlink Mini will also be a nice backup for the primary Starlink Gen2 residential terminal if that should ever fail. And if we do another cross country vehicle trip, I will certainly be bringing the Starlink Mini because even in this era, at least a couple of years ago, there were many mobile network dead zones on the East / West Interstate highways in the rural Western US.

Next summer, I'm going to have to repeat my Meadow Day experiment, only this time with the Starlink Mini instead of the Starlink Gen2 which wasn't exactly optimized for low power consumption powered by battery / solar, like the Starlink Mini is.

Or perhaps it would be neat fun to do *Winter Meadow Day 2026* to coincide with [Winter Field Day 2026](#).

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Renewed My ARRL Membership

By Steve Stroh N8GNJ

As long term readers of Zero Retries know, I've had, and continue to have, significant disagreements with ARRL leadership about internal ARRL politics, as well as three foundational issues:

- ARRL's Dismissive Arrogance re: Technician Class Amateur Radio Operators which I discussed extensively in **Zero Retries 0173**.
- In my opinion, ARRL is driving itself into irrelevance in the 21st century by keeping its primary material (magazines) behind a paywall. With ARRL's magazines, ARRL's enemy isn't piracy, its *irrelevance* in the face of competing media such as the excellent newsletter [The Communicator](#) that is free for everyone in the world to access. When someone is interested in learning more about Amateur Radio, they'll learn about it from sources like The Communicator rather than QST, QEX, Now You're Talking, etc.
- Additionally, ARRL is driving itself into irrelevance in the 21st century by keeping ARRL publications out of Internet Archive / [Digital Library of Amateur Radio & Communications](#), especially items that ARRL has no intention (or potential profit) of re-releasing in electronic form. Thus the ARRL gains nothing, and actively hurts itself (and by extension, ARRL members and Amateur Radio as a whole) with such a shortsighted policy.

I'd previously said that those disagreements were so severe that I was unlikely to renew my ARRL membership (which is due this month).

But...

Over the past eighteen months or so, there have been a number of positive, encouraging developments by ARRL that, collectively, have given *me* reason to renew *my* ARRL membership.

These developments are meaningful to *me*, influencing me to "vote with my wallet" and stating publicly that I remain a supporting member of ARRL.

Your calculus of whether ARRL is worth supporting, will likely vary.

- ARRL staff showed up *substantively* at a significant Amateur Radio (related) technical conference earlier this year - [HamSCI 2025](#). This is a reversal from ARRL "not paying attention" (from what I have observed) to Amateur Radio related Technical Conferences in the past decade. I observed the ARRL staff really engaging with the HamSCI attendees, especially the young, student Amateur Radio Operators.
- ARRL (~~Western Washington Section Leadership~~ *Northwestern Division Director Mark Tharp KB7HDX*) very rapidly approved inclusion of ZRDC 2025 as a supported, listed Amateur Radio conference. They did so *within hours of my application!* Candidly, I expected the application for ARRL to mention ZRDC 2025 would be rejected because ZRDC 2025 wasn't an event by an ARRL affiliated club. Irrespective of the direct benefit for ZRDC 2025, I was very pleasantly surprised to see such support for an *independent, technical* Amateur Radio conference from ARRL.
- ARRL has done a good job in expanding the available "seats" of ARRL's [Teachers Institute on Wireless Technology](#). When that program was begun, in my opinion it wasn't big enough to make a significant impact. ARRL has now expanded that program *to the point that it is having a significant impact*.
- ARRL's [Collegiate Amateur Radio Program](#) is some support for reviving an Amateur Radio presence at colleges and universities by supporting existing, and new, Amateur Radio clubs at colleges and universities. No other group or organization trying to do so systemically, thus ARRL is to be applauded and encouraged for this effort. As I will be documenting here in Zero Retries in the coming months, Amateur Radio has a lot to offer college students, especially Electrical Engineering Students (and departments / curriculums).
- While it's not an arrangement that I would consider optimum, ARRL has at least "tried something new" with two [reduced / free Student Membership tiers](#). It was refreshing to see that ARRL is... *trying*... in its way to address the "low youth participation" issue.
- Months after the event, I learned that Amateur Radio's participation (by Phil Karn KA9Q, in his role as a Board Member of ARDC) at the US National Telecommunications and Information Administration (NTIA)'s 2024 Spectrum Policy Symposium was initiated by ARRL behind the

scenes.

- Earlier this year, ARRL's Washington counsel David R. Siddall (K3ZJ) had an [in-person meeting with staff of the FCC's Wireless Telecommunications Bureau](#) to advocate for progressive changes to FCC Part 97 regulations for Amateur Radio. In person! No other Amateur Radio organization is doing so (in recent history).
- Over the past several years, and a number of FCC Request For Comments, *ARRL has consistently, substantively and authoritatively responded* to the FCC's Requests for Comments. No other Amateur Radio organization, including those with significant technical depth, and those with substantial resources, has done so consistently.
- This article - [Defending the Spectrum](#) was a good overview of what ARRL (and especially ARRL's Washington counsel David R. Siddall K3ZJ) is doing quietly, consistently in working with the FCC on behalf of Amateur Radio to keep Amateur Radio's relevance in the 2020s and beyond in the minds of FCC staff.
- While I viewed the de-allocation of US Amateur Radio's use of portions of the 3.5 GHz band as inevitable (it's allocated to commercial / fixed wireless services everywhere else in the world), that US Amateur Radio remains with *any* access to 3.5 GHz *at all*, [is apparently due to the efforts of the ARRL](#).
- Most importantly to me, ARRL's responses to the FCC's Request for Comments over the past several years have been enlightened, well-informed (about current and future radio technologies) and *forward thinking*. Notably, ARRL recommended that for the Amateur Radio VHF / UHF bands, symbol rates for data modes, and bandwidth limits for data modes should simply be deleted from the Amateur Radio regulations. ARRL's perspective is that doing so would strongly encourage more experimentation and technological innovation by Amateur Radio within those bands (that is discouraged at the moment).
- Lastly, whatever one might think about ARRL's campaign to [Pass the Amateur Radio Emergency Preparedness Act](#), given many more pressing matters in Congress... it's really good to see ARRL get behind *some* collective action to substantively advance US Amateur Radio, and trying to involve all US Amateur Radio Operators, not just ARRL members. I view this as hopefully just the first of a number of such future campaigns to unite US Amateur Radio Operators to update Amateur Radio regulations for the 21st century and help make Amateur Radio be perceived as relevant in the 21st century.

So... ARRL, count me in for another three years.

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A Remarkable Amateur Radio Presentation - LinHT at OpenAlt 2025 by Vlastimil Slinták OK5VAS

By Steve Stroh N8GNJ

While the information presented about LinHT was relevant and interesting, that wasn't the most interesting and engaging reason to spend a bit of time watching this video.

I added this to the LinHT article in the previous issue of Zero Retries:

Post Publication Update: LinHT at OpenAlt 2025

At OpenAlt 2025 on 2025-11-02, Vlastimil Slinták OK5VAS did a presentation on LinHT - LinHT: open-source SDR transceiver. The slides are in English, but the narration is in Czech, but I found that YouTube's auto-translate captioning worked well.

I strongly recommend watching this entire presentation (the YouTube link above begins at ~2:18 of the conference, the beginning of the [LINHT - OPEN SOURCE LINUX SDR HANDHELD](#) presentation).

I make this recommendation not for the obvious reason - learn more about the LinHT project (though there's plenty of good, and newer information about

that).

Amateur Radio of the 21st Century

Rather, I recommend watching this entire presentation because Vlastimil Slinták OK5VAS presents the LinHT project in the context of **Amateur Radio of the 21st Century**.

I doubt that you've seen Amateur Radio represented in this way, before.

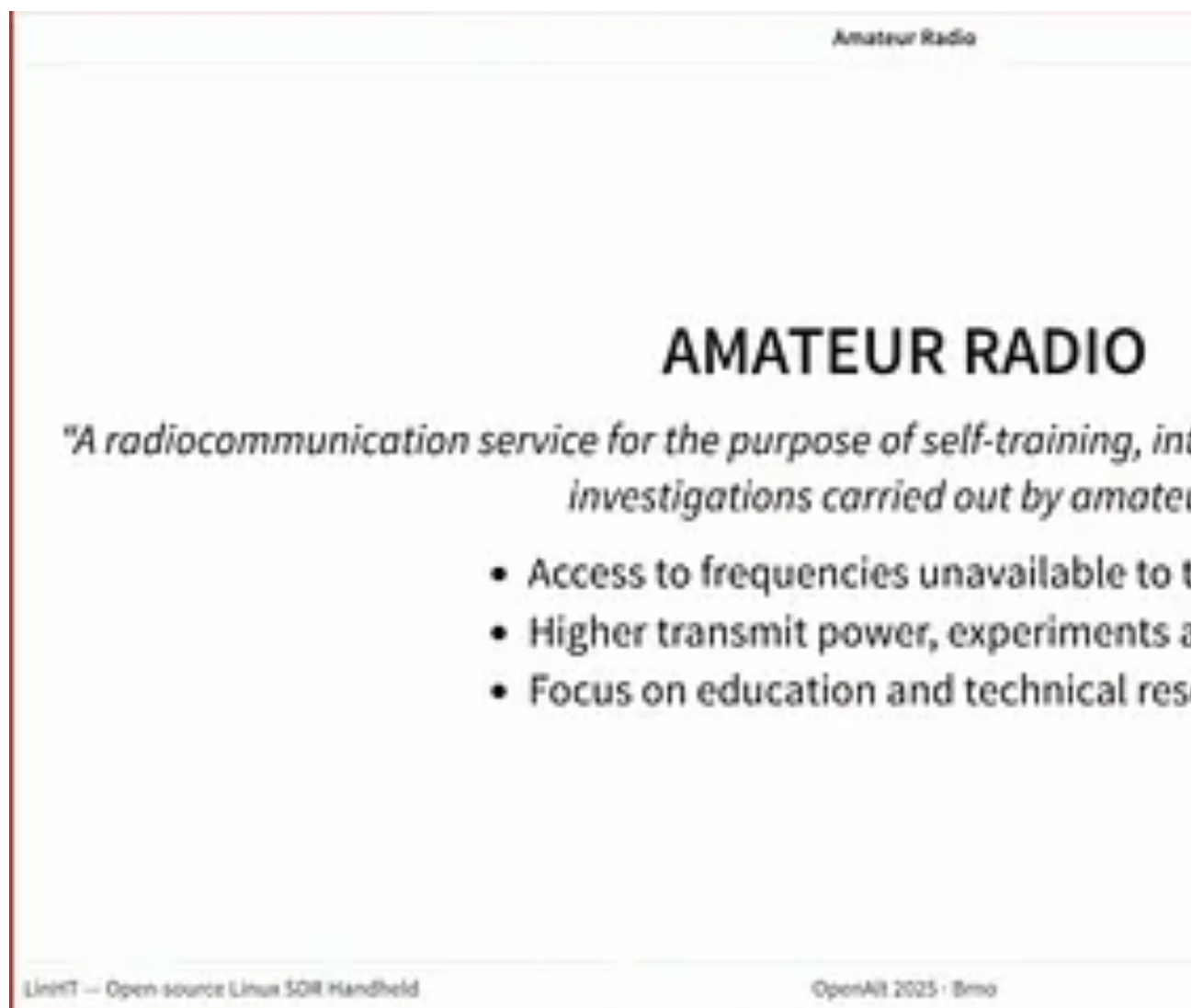


Image courtesy of Vlastimil Slinták OK5VAS

The above is a screen capture of one of the slides by OK5VAS.

Here's a (text) version for easier searching and copy / paste:

AMATEUR RADIO

"A radiocommunication service for the purpose of self-training, intercommunication and technical investigations carried out by amateur."

- Access to frequencies unavailable to the public
- Higher transmit power, experiments allowed
- Focus on education and technical research

Vlastimil Slinták OK5VAS at OpenAlt 2025

That... is a fantastically wise... *and wonderfully distilled* explanation of **Amateur Radio of the 21st Century**.

OK5VAS's perspective⁴ of Amateur Radio is *exactly* what I'm trying to explain with the use of the term *NewTechHams* here in Zero Retries.

His talking points about Amateur Radio:

- Self Training
- Technical Investigations
- Experiments allowed
- Focus on education and technical research

Those talking points are relevant in the 2020s and beyond as *reasons* for society as a whole, education institutions, media, content creators, curious techies, technical conferences, spectrum regulators, even commercial companies and government (including military) *to care about Amateur Radio!*

LinHT Development Needs Financial Support

Towards the end of the video, OK5VAS explains a bit more of the mechanics of the LinHT development process... and that it's expensive. OK5VAS said "hundreds of dollars per unit". Some points to consider (not all of which were mentioned by OK5VAS):

- At the moment, some of the expenses of development of the LinHT are being funded, and some future development costs will be helped by existing M17 Foundation funds.
- Although LinHT is a project of the M17 Foundation, that organization doesn't have much of a budget for the LinHT project (or much else). There are no grants in hand, or in progress, for M17 Foundation or the LinHT project specifically. Any significant organizational funding for the LinHT project will have to be new donations received by M17 Foundation.
- There are a lot of miscellaneous expenses, such as distributing prototype LinHT circuit boards to the three developers - one in Czech Republic, one in Austria, and one in Poland. The LinHT circuit boards are not inexpensive or simple to manufacture.
- There's the issue of extracting needed parts from the "donor" Retevis C62 units and transplanting them onto the prototype LinHT circuit boards. There are only four LinHT Revision 1 units in existence, and only three of them are working and usable for development. Creating prototype LinHT units is tedious work requiring good electronics repair equipment.
- The second revision of the LinHT circuit board (design in progress) will incorporate various lessons learned and a 5 watt power amplifier. That will undoubtedly result in new complications and testing requirements.
- I imagine that there will ultimately be a third revision of the LinHT circuit board needed as a final, well-proven design that can be readily replicated by a manufacturer.
- There will a need to a larger quantity of LinHT units needed for proof of concept demonstrators to potential manufacturers, units that can be demonstrated at conferences, units for additional software development. Just one example will be at least a few units made available to GNU Radio developers to validate LinHT's usability with GNU Radio. Probably some LinHT units will need to be sent to the US for software development (shipping is not cheap). Remember, LinHT is supposed to be usable for nearly any Software Defined Radio mode, so that needs to be demonstrated and proven.
- One subtle issue is that once the LinHT gets the attention of China radio manufacturers, *it will happen fast*. The pattern with such open source projects is one design is rapidly cloned by multiple companies. That could backfire if the version that gets cloned is "too early", so iteration needs to be pretty rapid - with funding readily available to do so.

LinHT is the most important hardware project in Amateur Radio today.

[Bruce Perens K6BP](#), 2025-08-12

Thus, the above points are offered in support of a blatant plea for Zero Retries readers to please [donate to the M17 Foundation](#) to support development of the LinHT project.

I know that a plea for individual donations seems an odd request given the importance of the LinHT project, and given that [ARDC distributes grants of ~US\\$5M annually](#). But, at the moment, it doesn't seem likely that ARDC will be providing a grant to M17 Foundation or the LinHT project specifically. If you think this shouldn't be the case, all I can suggest is to [contact ARDC directly](#) to make your view on this subject known.

Another possibility of funding LinHT development is crowdfunding... but no specifics of a LinHT crowdfunding campaign have been considered quite yet (again, LinHT is just at the "we've gotten it working" *prototype stage*). *If you have some direct experience* with conducting a crowdfunding campaign, especially an Amateur Radio project, please consider [getting in touch with M17 Foundation](#).

As soon as Zero Retries funds are just a bit more replenished (from paying the last expenses of ZRDC 2025), we'll be making a donation of \$250 to M17 Foundation within the next month to support LinHT development.

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Retreating from Repurposing Existing Repeaters

By Steve Stroh N8GNJ

For years I have been campaigning for owners of quiet, largely unused repeaters to consider converting such repeaters to be more useful, such as being able to carry data. I'm declaring my campaign done, with nothing to show for it. Entropy has won.

In conceding defeat in this campaign, I'm certainly not saying that repeaters aren't useful for data... only that owners of existing repeaters apparently prefer their repeaters to be quiet and unused. Otherwise they would try something new, like data. I've been told of perhaps two or three groups that have read of my ideas about repurposing existing repeaters for data use and tried it. That's nice, but that level of "conversion" to the idea just isn't worth continuing the campaign. The entropy of quiet, largely unused repeaters has won.

As Scott Currie NS7C explained in the article VARA FM Via FM (Analog) Repeater in **Zero Retries 0223**, and my SuperPeater Concept, there's fantastic utility in a such use of a repeater... but the reality is that such repeaters will apparently have to be new systems, built for purpose, using additional Amateur Radio spectrum.

I added this to my SuperPeater page:

Postscript: In the paper, part of my rationale for explaining SuperPeaters was the hope that existing Amateur Radio repeaters that were rarely used could be repurposed into SuperPeaters. That idea has not been accepted by any repeater owners (that I'm aware of). Thus, of necessity, SuperPeaters will have to be new systems, occupying additional Amateur Radio spectrum.

Mesh Networking Is "Repeaters of the 21st Century"

Instead of repurposing existing Amateur Radio Repeaters, when it's not feasible to create a new dedicated repeater, or a SuperPeater, us "network progressives" are going to start building heterogeneous mesh networks - AREDN, IP400, New Packet Radio, even [Net/ROM](#). (Yes, really, *Net/ROM*, aka *TheNet*). Imagine how powerful Net/ROM networking is in 2025 running on a dedicated Linux box, using higher speeds with Forward Error Correction, and ports. TCP/IP connectivity / routing courtesy of JNOS. That's on the list of experimentation in N8GNJ / Zero Retries Labs.)

For example, in the early stages of the [IP400 Network Project](#), Martin Alcock VE6VH and I strategized about the role of repeaters in future Amateur Radio networks which have largely adopted mesh networking (such as Meshtastic). What we... (*or I... I'm not sure VE6VH bought into the idea*) settled on was to create an IP400 module that would allow repeaters to participate in a mesh network. As in, upon activation for the first time, an IP400 user node would monitor for other IP400 units / mesh networks. If another IP400 user, or an IP400 mesh network, or an IP400 repeater [5](#) was found, make use of that. Otherwise, begin beaconing to establish a new IP400 mesh network. It wasn't an either / or scenario; I imagined that an IP400 repeater could bridge otherwise disconnected mesh networks.

And, in my SuperPeater concept, as I develop it, *mesh networking will be the primary networking scenario*. Where they are available, SuperPeaters will act as "SuperNodes" in a mesh network. Fortunately, the technologies incorporated into SuperPeaters will enable them to "fit in" to the Amateur Radio 6m, 2m, 1.25m, and 70cm, 33cm, and 23cm repeater bands that are "pretty full", using techniques such as Single Channel TDMA repeaters, cross band repeaters, and even using the same channels of repeaters that are almost entirely unused - as long as the legacy repeater's usage is "respected as primary".

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ZR > BEACON

By Steve Stroh N8GNJ

Short mentions of Zero Retries Interesting items.

Brief Update on KK7NQN Transcriber Service Node

For background, view the KK7NQN video from Zero Retries Digital Conference 2025.

I checked in via email with Hunter Inman KK7NQN about progress on this project, and he replied:

I just completed a major upgrade (stage 1 of a large Plan I am working on) where now I have the AI server doing stuff like NCS / Net tracking and topic tracking. This allows way more in-depth data to be extracted and displayed like showing topic trends across nets and operators.

This is all now viewable on the "Extended Data" tab on the [website](#).

When I'm finally able to build some kind of a prototype of a SuperPeater, the voice functionality will incorporate a KK7NQN Transcriber Service Node.

[Introducing the Stixs Radio](#)

At its core, the Radio is a handheld, Linux-based (Armbian) radio platform that blends analog VHF/UHF FM voice with LoRa data networking and Wi-Fi connectivity. It's designed to feel like a modern "smart walkie-talkie" — a decent hybrid between a classic handheld transceiver and a connected computing device.

I am building this simply because I have gone through a couple of handhelds now and nothing seems to tick all the boxes for me.

Everything is built around the idea of **building an open platform that can be tinkered with**. You can script it, modify it, build plugins for it, or just use it like a normal radio. It's built to be hackable and extendable — something I've always felt was missing from the swathe of commercial handhelds.

The core features are,

- **VHF/UHF voice** (standard FM, CTCSS/DCS, VOX, tone squelch)
- **LoRa mesh communication** — text messages and telemetry between units (using Meshtastic python cli)
- **Encrypted messaging** — hardware crypto chip for secure identity and locked comms

- **Linux-based core** — runs Armbian; can log, script, or automate messages and location data
- **4.5" touchscreen UI** — easy to manage channels, contacts, and mesh nodes
- **Wi-Fi** — bridge your mesh to a local network, get continuous updates and download third party packages
- **USB-C PD fast charging** — charge from a solar bank or standard USB power
- **Removable Li-ion battery** — 8–10 hours of mixed use, field-rechargeable
- **Dual antennas** — one for LoRa mesh, one for VHF/UHF analog

On this [page](#) were some intended features derived from user requests:

Overall there were some key actions that I took out of that, they are below,

- Include **packet radio/TNC** and **APRS messaging** early.
- Implement **rolling recorder** and easy export (without microSD).
- Keep UI **big, clean, and fast**; power-save aggressively.
- Expose **remote APIs/Web UI** (already planned).
- Leave hooks for **future digital modes** and true **dual-RX**.
- Ship **spectrum analyser** in initial software.

Interesting project, and another indication that “the time has come” for handheld user-defined Software Defined Transceivers to emerge. The creator doesn’t specifically mention Amateur Radio, but it’s clear that’s one of the intended use cases, from displaying 146.52 on one of the graphics, to mention of Packet Radio, TNC, and APRS messaging.

My thanks to Zero Retries reader (and ZRDC 2025 attendee) Dave Stewart K7XST for letting me know about this development.

[FSF Announces Librephone Project](#)

Librephone is a new initiative by the FSF with the goal of bringing full freedom to the mobile computing environment. The vast majority of software users around the world use a mobile phone as their primary computing device. After forty years of advocacy for computing freedom, the FSF will now work to bring the right to study, change, share, and modify the programs users depend on in their daily lives to mobile phones.

...

Practically, Librephone aims to close the last gaps between existing distributions of the Android operating system and software freedom. The FSF has hired experienced developer Rob Savoye (DejaGNU, Gnash, OpenStreetMap, and more) to lead the technical project. He is currently investigating the state of device firmware and binary blobs in other mobile phone freedom projects, prioritizing the free software work done by the not entirely free software mobile phone operating system LineageOS.

...

Besides the campaign information at <https://fsf.org/campaigns/librephone>, the project will have its own website at <https://librephone.fsf.org> and anyone can connect using #librephone irc on [irc.libera.chat](https://libera.chat).

Kudos to initial project sponsor John Gilmore W0GNU with a personal donation sufficient to provide focused effort on this project.

I think this is notable for Amateur Radio to create a mobile, stable, implementation of (another) open source optimized-for-mobile operating system that might be a bit more suitable for future Amateur Radio projects such as the LinHT.

[FreakWAN](#)

FreakWAN is an effort to create a LoRa-based open WAN network, completely independent from Internet and the cellular phones networks. The network built with FreakWAN has two main goals:

1. To provide both a plaintext and an encrypted distributed chat system, that can be used by technology amateurs, or in places where internet is not available and during disasters.
2. As a side effect of the first goal, to create a robust protocol over LoRa to support other applications, like sensors data collection, home automation applications, not having the usual range limitations of OOK/FSK communication, and so forth.

Our goal is to cover parts of the Sicily with such a network. The code will be freely available to anyone wanting to build their own LoRa WANs on top of this software. The main features of our implementation and protocol are the following:

- A distributed network based on LoRa and broadcast routing.
- Basic chat features, ability to send medias (like small images).
- Different group chat or data channels (including one-to-one chats) using encryption to separate them.
- Configurable number of retransmissions with random delays.

- First-hop acknowledges of messages sent.
- Symmetric encryption with AES in CBC mode, with support for integrity detection and multiple concurrent keys: each group of clients knowing a given key is part of a virtual group. The network is collaborative for encrypted messages: even nodes that are not able to decrypt a given message can broadcast it, since the encrypted part is not vital to perform relaying of messages.
- Sensing of nearby nodes, via HELLO messages (advertising).
- Bandwidth usage mitigation features.
- Duty cycle tracking.
- Local storage of messages in the device flash, with automatic deletion of old messages.
- Simple home-made driver for the SX1276 and SX1262 LoRa chip. In general, no external dependencies. Runs with vanilla MicroPython installs.
- OLED terminal alike output. OLED burning pixels protection.
- CLI interface via USB serial and Bluetooth LE.
- IRC interface: the device can work as a bot over the IRC protocol.
- Simple to understand, hackable code base.

More evidence that dynamic, ad hoc, decentralized, no-fixed-infrastructure Mesh Networking is getting a lot of attention for development.

Matchbox APRS

Modular and portable APRS platform: a miniaturized FSK modem and APRS system in a compact and extensible 50x35mm form factor, the size of a box of matches.

Matchbox is made of two boards, with a Li-Po battery sandwiched in between. The boards are connected using two flex cable connectors. Each board can be used standalone.

Motivation

I've always liked the idea of small, inexpensive digipeaters that you could throw in a car and set up anywhere during an emergency. Imagine a truck deploying hundreds of them across an affected area. If they're cheap enough that recovery isn't a concern, and smart so that they don't create congestion, it changes how we think about emergency communications. Projects like Meshtastic have shown how far modern features can be pushed into very low-cost hardware, and the same principle applies here. The goal is a device that's affordable enough to be nearly disposable, but still flexible, modern, and genuinely useful in the real world. APRS today is often too expensive once you factor in demodulator robustness, size, and power. I'd like to see APRS succeed by becoming more democratized, accessible and widely adopted.

Second, I wanted a place to integrate the C++ APRS code I've been building over the years — a tracker, digipeater, and other libraries. Having a single platform you can hold in your hands that brings all of these pieces together makes it easier to develop, test, and see how they fit into the bigger picture.

Architecture

The modem mainboard is based on the Nino TNC design and firmware. NinoTNC firmware and circuit copyright (C) Nino Carrillo (<https://ninotnc.com>).

The APRS system daughterboard adds standalone tracking and digipeating capabilities, with BLE/BT Classic access to the modem and Wi-Fi connectivity. The daughterboard controls the entire platform.

A 24-pin FFC expansion connector exposes modem mode selection, two serial ports (one to the TNC, one to USB), and status signals such as DCD and Packet Good.

Power is provided through a USB-C port via a low-noise LDO regulator with reverse-current protection. This design allows seamless switchover between USB and external 3.3 V supplies.

I had mentioned this project in a previous issue of Zero Retries when I first saw it mentioned on Facebook. The link above is on the open web (Github). The developer continues to make progress on this.

If this project graduates from a project to a product, it will be interesting to see, but I suspect that all the functionality of this and similar units will just be features of systems like the LinHT.

W1BTR Big Time Radio - Radio Programming Services

Why buy expensive software and programming cables?

We can program radios for you at a flat cost: \$5/channel or \$40 (per radio), whichever is higher. We can also add custom startup messages, settings, setup MDCIDs, and more!

Programming software is expensive, especially for commercial radios, and that's assuming you can even find a copy!

Programming 5 or more of the same radio? Get a 10% discount!

Programming 10 or more of the same radio? Get a 30% discount!

This is a service that I'd been looking for, for a long time - turnkey programming of (repurposed) commercial two way radios. The three brands listed are Kenwood, Motorola, and Icom. To me this makes complete sense, especially for Motorola. I don't fault them for this statement:

All Motorola Radios, other than XPR 3000, 6000, and 7000 series require an additional \$10 fee since Motorola is so hard and anti-consumer to work with.

Surplus commercial radios are a great fit for data use given that you don't typically change frequency (of a radio dedicated to data use). While the interface instructions for commercial radios is relatively easy to find, and implement, such as creating a custom cable for data use, *programming the radio for the frequencies required* that flummoxes the average Amateur Radio Operator. This service seems a reasonable way to address that issue.

Leave a comment

Share

Comments Summary From Previous Issue

Comments from Zero Retries 0226

- Lots of helpful suggestions about my new power system and practical tips about the new Bioenno battery.
- Mention and explanation of the existence of a 13 MHz ISM (Industrial, Scientific, and Medical - aka, unlicensed) portion of spectrum. But very low power.
- More discussion about the appropriateness and application of a restriction against encryption in Amateur Radio.
- Brief discussion of OpenGD77.

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Zero Retries Boilerplate

The [Zero Retries Store](#) is now open for business with quality Zero Retries branded merchandise and items being retired from Steve's N8GNJ Labs.

These bits were handcrafted (by a mere human, not an Artificial Intelligence bot) in beautiful Bellingham ([The City of Subdued Excitement](#)), Washington, USA, and linked to the Internet via [Starlink Satellite Internet Access](#).

See the **Zero Retries Boilerplate** page for significant acknowledgements and other information relevant to Zero Retries. For new readers of Zero Retries, that page, and the **About Zero Retries** page has useful information to check out.

My ongoing *Thanks* to:

Tina Stroh KD7WSF for, well, *everything*!

Jack Stroh, Late Night Assistant Editor Emeritus

Shrekky Stroh, Late Night Assistant Editor In training

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You thousands of readers of Zero Retries without which there would be little point in publishing this newsletter.

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Keywords for this Issue

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Amateur Radio, AnySignal, ARRL, **Data Communications**, **Digital Communications**, **Digital Voice**, **DV**, FreakWAN, **Ham Radio**, KK7NQ, Transcriber Service Node, Vibraphone, LinHT, Matchbox APRS Mesh Networking, **N8GNJ**, **Packet Radio**, **Radio Technology**, **Software Defined Radio**, **Software Defined Receiver**, Starlink Mini, **Steve Stroh**, Stixs Radio, Vlastimil Slinták OK5VAS, WIBTR Big Time Radio, **Zero Retries**, **Zero Retries Digital Conference**, **ZRDC 2025**

Keywords in **Bold** are regular mentions in each issue.

Footnotes for this Issue

To see the relevant sentence for the footnote, just click the footnote number.

[1](#)

"Fable" of Contents is a homage to Editor Rotundus (*his* self-assigned title) and my kind-of mentor, the late (and very missed) Jack Rickard of Boardwatch Magazine.

[2](#)

In text, they apparently prefer **AnySignal**. On logos, and hats, they use **ANYSIGNAL**.

[3](#)

At a quick check, I guess I could watch YouTube at 144p - that only requires 150 kbps.

[4](#)

Admittedly some of this difference of perspective about Amateur Radio may well be a result of Czech Republic's Amateur Radio regulations versus US Amateur Radio regulations.

[5](#)

The differentiation of an IP400 Repeater Node, versus an IP400 Mesh Network node, (again, as I envisioned those two different types of nodes) is that a repeater node would be high profile and operate with different input / output frequencies (to eliminate the [Hidden Node Problem](#), and perhaps link to other network systems such as AREDN).